

REMARKS

Claims 1-15 are pending and stand ready for further action on the merits. Support for new claim 15 can be found on claim 1. No new matter has been added by way of the above-amendment. The above-amendment does not narrow the scope of the inventive claims and/or has not been made for the sake of patentability.

The following sections correspond to the sections of the outstanding Office Action.

Issues under 35 U.S.C. 112, 1st paragraph

Claims 1-14 are rejected under 35 U.S.C. 112, 1st paragraph. Applicants respectfully traverse the rejection.

Specifically, the Examiner objects to the embodiment of the inventive claims wherein R_1 of Formula (I) is a substituted or unsubstituted heterocyclic aromatic group. The Examiner finds that the present specification provides enablement for the inventive composition when R_1 is a substituted or unsubstituted carbocyclic aromatic group but does not provide sufficient enablement under 35 U.S.C. 112, 1st paragraph when R_1 represents a substituted or unsubstituted heterocyclic aromatic group.

In support of the rejection, the Examiner states that the compounds wherein R_1 represents a substituted or unsubstituted heterocyclic aromatic group are not enabled because:

heterocyclic moieties may possess a broad range of functional characteristics, [w]hich may substantially alter the overall performance of the arylbenzofuranone.

In addition, the Examiner appears to be arguing that the present disclosure does not meet the requirements of 35 USC 112, first paragraph for lacking sufficient written description. The Examiner's comments on this matter are as follows:

Applicant has provided no real description of the arylbenzofuranone which possess a heterocyclic aromatic group as R_1 .

Enablement Requirement:

First, Applicants respectfully submit that the Examiner has made assertions against the validity of the statements made in the present specification without supporting evidence. As stated by the Federal Circuit in *In re Oetiker*, 24 USPQ2d 1443 (Fed. Cir. 1992), "[i]f the examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent." (*Id.*, 24 USPQ2d at 1444).

Accordingly, the Examiner has the burden of showing that the application is nonenabling (i.e., that it does not sufficiently teach how to make and use the invention). MPEP § 2164.04 instructs

that a specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the enablement requirement of 35 U.S.C. 112, first paragraph, unless there is a reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. As stated by the Federal Circuit:

When rejecting a claim under the enablement requirement of Section 112, the [Patent Office] bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by the claim is not adequately enabled by the description of the invention provided in the specification of the application; this includes, of course, providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement. *In re Wright*, 999 F.2d 1557, 27 USPQ 2d 1510, 1513 (Fed. Cir. 1993).

Upon review of the Examiner's comments in the outstanding Office Action, Applicants respectfully submit that the Examiner has not provided sufficient reasons for doubting that there is sufficient enablement for compounds when R₁ represents a substituted or unsubstituted heterocyclic aromatic group.

The analysis under 35 USC 112, first paragraph is set forth at MPEP §2164.01(a). This section lists many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure satisfies/does not satisfy the enablement requirement and whether any necessary experimentation is "undue." These factors include, but are not

limited to:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

With regard to factor (A), at issue is only whether the present specification enables the skilled artisan to make and/or use a heterocyclic aromatic group in place of the carbocyclic starting materials as the substituent at the 3-position of the benzofuranones and to make and/or use an aromatic monovinyl resin composition which includes these 3-(heteroaryl)benzofuranones, wherein the aromatic monovinyl resin composition has limited residual aromatic monovinyl monomer. Applicants respectfully submit that in applying each of these above-factors to the claimed invention, as amended above, there is sufficient guidance for the skilled artisan to make and/or use the present invention.

With regard to factors (B), (D), (F), (G) and (H), in the present case, the skilled artisan is aided by the instant disclosure wherein ortho- and meta-xylenes are used as the source

for the substituent at the 3-position of the benzofuranones. See Preparation Examples 1 and 2 on pages 22-23 of the specification. It would not be an undue burden on the skilled artisan to modify the reaction conditions given at pages 22-23 of the present specification to use a heterocyclic aromatic group in place of the xylene starting materials as the source for the substituent at the 3-position of the benzofuranones.

With regard to factor (C), there are several references of record showing methods for preparing 3-arylbenzofuranones including: US 4,338,244, JP 11-080563, and JP 2001-181270. Again, it would not be an undue burden on the skilled artisan to modify the reaction conditions given in these references to make benzofuranones having a heterocyclic aromatic group in place of the carbocyclic aromatic group as the substituent at the 3-position.

With regard to factors (E) and (H), Applicants respectfully submit that *In re Angstadt*, 190 USPQ 214 (C.C.P.A. 1976) is controlling to the present fact situation.

Angstadt is an example of when the invention involved an unpredictable chemical reaction and the application was rejected as nonenabling. In *Angstadt*, the invention related to a chemical reaction process that produced various oxidation products, including the preferred hydroperoxide product. The invention included the discovery that certain metals could be used as catalysts to provide excellent production yields of the

hydroperoxides at a much faster rate. The Examiner rejected the application claims as nonenabling, in part because the disclosure did not explain how operative catalysts could be determined to perform the claimed process.

On appeal, the CCPA reversed, remarking that the requirements for enabling one of ordinary skill to make and use the invention depended, in part, on the predictability and repeatability of the invention. As stated by the CCPA, "[w]e note that many chemical processes, and catalytic processes particularly, are unpredictable, ... and that the scope of enablement varies inversely with the degree of unpredictability involved." *Id.*, 190 USPQ at 218 (citing *In re Mercier*, 185 USPQ 774, 779 (C.C.P.A. 1975); *In re Fisher*, 166 USPQ 18, 24 (C.C.P.A. 1970)).

The CCPA acknowledged that the claimed invention was unpredictable. Evidence of unpredictability included the fact that of the disclosed 40 examples of chemical reactions in the application, one provided no hydroperoxides at all.

The CCPA also added that the specification did not disclose every catalyst that would work or every catalyst that would not work. Nevertheless, the CCPA held that even in unpredictable arts, the specification need not disclose every example or species covered by a claim:

To require such a complete disclosure would apparently necessitate a patent application or applications with "thousands" of examples or the disclosure of "thousands" of

catalysts. . . . More importantly, such a requirement would force an inventor seeking adequate patent protection to carry out a prohibitive number of actual experiments. This would tend to discourage inventors from filing patent applications in an unpredictable area since the patent claims would have to be limited to those embodiments which are expressly disclosed. A potential infringer could readily avoid "literal" infringement of such claims by merely finding another analogous catalyst complex which could be used in "forming hydroperoxide." *In re Angstadt*, 190 USPQ at 218.

Because the application included a list of catalysts and taught how to make and use them, the CCPA held that the experimentation required to determine which catalysts produced the asserted results was not overly burdensome. Therefore, the CCPA held the application to be enabling under Section 112, first paragraph.

Thus, parallels between *Angstadt* and the present case are numerous. When applying the rationale set forth in *Angstadt* to the instant case and the weighing each of factors (A) through (H), even though there is a certain level of unpredictability in the field, the skilled artisan would not have an undue burden to make and/or use a (substituted or unsubstituted) heterocyclic aromatic group in place of the carbocyclic starting materials as the substituent at the 3-position of the benzofuranones and to make and/or use an aromatic monovinyl resin composition which includes these 3-(heteroaryl)benzofuranones, wherein the aromatic monovinyl resin composition has limited residual aromatic monovinyl monomer.

As such, the present invention meets the enablement requirement of 35 USC 112, first paragraph.

Written Description Requirement:

Applicants respectfully submit that the inventive disclosure conveys with reasonable clarity to those skilled in the art, that, as of the filing date sought, the present inventors were in possession of the invention, and that the invention in that context, is what is now claimed. The presently claimed disclosure therefore satisfies the requirements set forth in *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991).

An applicant may show possession of the claimed invention in a variety of ways including description of an actual reduction to practice, or by showing that the invention was "ready for patenting" such as by describing distinguishing identifying characteristics sufficient to show that the applicant was in possession of the claimed invention. See, e.g., *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 68, 119 S.Ct. 304, 312, 48 USPQ2d 1641, 1647 (1998); and *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). The court in *Amgen, Inc. v. Chugai Pharmaceutical*, 927 F.2d 1200, 1206, 18 USPQ2d 1016, 1021 (Fed. Cir. 1991) stated that all that is necessary to satisfy the written description

requirement is to define the compound by "whatever characteristics sufficiently distinguish it".

In the present case, the description in the specification contains sufficient guidance for the skilled artisan to prepare a (substituted or unsubstituted) heterocyclic aromatic group in place of the carbocyclic starting materials as the substituent at the 3-position of the benzofuranones.

Finally, it should be pointed out to the Examiner that the present invention is a fundamental invention, i.e., it describes the first use of a (substituted or unsubstituted) heterocyclic or carbocyclic aromatic group as the substituent at the 3-position of the benzofuranones for use in an aromatic monovinyl resin composition containing low aromatic monovinyl monomer amounts. Accordingly, limiting the scope of the claims to embodiments wherein a carbocyclic aromatic group is used as the substituent at the 3-position of the benzofuranones does not provide the inventors with an adequate protection relative to their contribution to the art.

Based on the foregoing, Applicants respectfully submit that the inventive disclosure provides sufficient written description support and enablement for the claimed invention, and withdrawal of the rejection under 35 U.S.C. 112, first paragraph (for lack of enablement and written description), is respectfully requested.

Prior Art Based Issues

The following rejections are pending:

- a) Claims 1, 2, 4 and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hinsken et al. U.S. 4,338,244; and
- b) Claims 3-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hinsken et al.

Applicants respectfully traverse each of the rejections.

As noted on page 2, lines 18-23 of the present specification, the presently claimed invention is patentable over the teachings of Hinsken et al., since Hinsken et al. is completely silent with respect to the residual aromatic monovinyl monomer in the product resin composition. The present invention requires that the product resin composition contains not more than 100ppm residual aromatic monovinyl monomer.

As the MPEP directs, all the claim limitations must be taught or suggested by the prior art to establish a *prima facie* case of anticipation or obviousness. See MPEP §§ 2131 and 2143.03. Applicants respectfully submit that a *prima facie* case of anticipation or obviousness cannot be said to exist, since Hinsken et al. fail to teach or fairly suggest that the product resin composition contains not more than 100ppm residual aromatic monovinyl monomer, as presently claimed.

Furthermore, Applicants respectfully submit that Hinsken et al. **do not inherently teach** that the product resin composition contains not more than 100ppm residual aromatic monovinyl monomer for the following reasons.

When polystyrene resin is produced by a bulk or solution polymerization method, for example, unreacted monomers and polymeric solvents are generally removed with a devolatilizing apparatus under high temperatures and vacuum from the polymeric solution in which the polymerization has been completed, whereby the desired resin is obtained. As the temperature or the degree of vacuum increases, the more the residual amount of monomers in the resin decreases. However, the present inventors have found that with aromatic monovinyl type resins, the more the temperature increases, there is a considerable increase in monomers due to heat decomposition. In other words, there is a depolymerization resulting in additional monomers due to heat decomposition. Therefore, it is extremely difficult to decrease the concentration of the residual monomer in aromatic monovinyl type resins to 100 ppm or less (see Comparative Example 1). Indeed, a variety of commercially available aromatic monovinyl type resins (e.g., polystyrene resin) have been analyzed, and there has not been found any resins with a residual monomer concentration of 100 ppm or less. The present invention consists in the first finding by the inventors that when a particular stabilizer is added at a specific stage of the polymerization

step in a specific amount, the residual amount of monomers can be reduced to 100 ppm or less.

Under the conditions conventionally employed by one of ordinary skill in the art, the residual amount of monomers in the resin cannot be reduced to 100 ppm or less, as shown in Comparative Example 1.

The following table summarizes the results of Examples 1, 2 and Comparative Example 1.

	Deterioration inhibitor		Pellet Residual amount of styrene monomer (ppm)	Conditions for devolatilizing apparatus			
	Kind *1	Amount (wt%)		Former extruder		Latter extruder	
				Temp. (C°)	Degree of vacuum (torr)	Temp. (C°)	Degree of vacuum (torr)
Ex. 1	ABF1	0.15	43	190~200	30	220~240	5
Ex. 2	ABF1	0.05	57	190~200	30	200~240	5
Comp. Ex. 1	-	(no added)	165	190~200	30	220~240	5

*1: ABF1 5,7-di-tert-butyl-3-(3,4-dimethylphenyl)-
3H-benzofuran-2-one

To support an anticipation rejection based upon inherency, an Examiner must provide factual and technical grounds establishing that the inherent feature necessarily flows from the teachings of the prior art. See *Ex parte Levy* 17 USPQ2d 1461 (BOPAI 1990); see also *In re Oelrich*, 212 USPQ 323 (CCPA 1981) holding that

inherency *must* flow as a necessary conclusion from the prior art, not simply a possible one.

Based on the foregoing comments, it is clear that a prima facie case of anticipation or obviousness cannot be said to exist, since Hinsken et al. fail to explicitly or implicitly teach or suggest the inventive composition. Accordingly, withdrawal of the rejections are respectfully requested.

Conclusion

In view of the above amendments and comments, Applicants respectfully submit that the claims are in condition for allowance. A notice to such effect is earnestly solicited.

If the Examiner has any questions concerning this application, he is requested to contact **Garth M. Dahlen, Ph.D., Esq.** (#43,575) at the offices of Birch, Stewart, Kolasch & Birch, LLP.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional

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fees required under 37 C.F.R. § 1.16 or under § 1.17;
particularly, extension of time fees.

Respectfully submitted,

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